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SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

PTOL-90A (Rev. 10/06)

	Application No.	Applicant(s)
Office Action Summary	10/787,320	DEKONING ET AL.
	Examiner	Art Unit	
	Patrick A. Darno	2163	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>23 January 2007</u>.

2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-17,19-24 and 26-32</u> is/are pending in the application.

  4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-17, 19-24, and 26-32</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>27 February 2004</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.

  Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

  Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

  a)☐ All b)☐ Some * c)☐ None of:

  1.☐ Certified copies of the priority documents have been received.

  2.☐ Certified copies of the priority documents have been received in Application No. _____.

  3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

  * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☒ Information Disclosure Statement(s) (PTO-SB/08)
  Paper No(s)/Mail Date <u>See Continuation Sheet</u>.

4)☐ Interview Summary (PTO-413)
  Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application

6)☐ Other: _____ .

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :01082007 and 11022006 and 10022006.

DETAILED ACTION

1.   Claims 31-32 have been added. Claims 18 and 25 have been canceled. Claims 1-5, 7-17,

19, 23-24, and 26-30 have been amended. Therefore, claims 1-17, 19-24, and 26-32 are pending

in this office action.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or
any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and
requirements of this title.

2.   Claims 15-22 and 27-30 are rejected under 35 U.S.C. 101 because the claims are directed

to non-statutory subject matter.

With respect to claims 15, the claim recites a system. However, the claims are not

actually limited to any physical articles or objects. It appears that the Applicant is seeking to

patent particular programmed functionality of the components rather than the components

themselves. Specifically, the claim limitations of 'a virtualization layer...', 'a snapshot layer',

and 'an overall snapshot object' all appear to be directed to implementations of software. Since

the limitations are indeed directed to programmed functionality and not the components of an

apparatus themselves, the claimed programmed functionality must have a final result achieved,

which is useful, concrete, and tangible. The claim needs to be amended in the same manner as

claim 1.

Claims 16-22 are rejected because they contain the deficiencies of claim 15.

With respect to claim 27, the claim is directed to computer readable medium 'containing'

program code. But, it appears that the computer readable medium that is claimed by the

Applicant is not limited to physical articles or objects, which are structurally and functionally

interrelated to the program in such a manner that would enable the program to act as a computer component and realize any functionality. In paragraph [0175] of the Applicant states that the computer readable medium for which the computer program of the invention can be embodied includes a carrier wave from the Internet or other propagation medium. However, this type of communication medium or transmission medium is not limited to media which meet the criteria set forth above.

In order to overcome this rejection, the Applicant must either 1) amend the claims in such a fashion that eliminates the possibility that 'a carrier wave from the Internet or other propagation medium' can be included as a computer readable medium, or 2) make a clear disavowal, on the record, of all embodiments that may include 'a carrier wave from the Internet or other propagation medium' to be an appropriate computer readable medium. Either of the above choices would rectify the deficiency, but at least one is required in order to overcome this rejection.

Claims 28-30 are rejected because they contain the deficiencies of claim 27.

Claim Rejections - 35 USC § 102

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3.   Claims 1-3, 4-6, 8-17, 19-24, and 26-32 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent Number 6,981,114 issued to Weibao Wu et al. (hereinafter "Wu").

Claim 1:

Wu discloses a method for creating a snapshot of a virtual volume containing stored data *(Wu: column 4, lines 50-55)* comprising:

identifying a virtual volume comprising a plurality of objects defining a mapping to data

in at least one storage device wherein each one of the objects corresponds to a different portion

of the virtual volume *(Wu: column 4, lines 27-35 and column 4, lines 39-43 and column 4, lines 50-55; Note*

specifically "original volume may correspond to ... a portion of one or more logical volumes..."), and

wherein the objects are distributed across more than one processor in a virtualization layer

between at least one host and the at least one storage device *(Wu: Fig. 1 and Fig. 2 and column 4, lines*

9-15 and column 4, lines 27-35 and column 4, lines 39-43 and column 4, lines 50-55; Each host (Fig. 1, 102 or Fig.

2, 200) contains a volume manager. Each volume manager includes functionality to create a snapshot 270

corresponding to a virtual volume or a portion of a virtual volume. Each host can request its own snapshot of a

portion of a virtual volume. Fig. 1 shows that there are a plurality of hosts each which can request their own

snapshots from a portion of virtualized storage (virtualization layer). Therefore, it is clear that snapshots (objects)

are distributed across more than one processor.);

creating a set of partition snapshots for the plurality of objects, with one partition

snapshot for each of the objects, wherein each of the partition snapshots comprises a point-in-

time copy of the different portion of the virtual volume corresponding to the one of the objects

(Wu: column 4, lines 50-55 and column 5, lines 46-51; Note specifically "Volume manager includes functionality to

create a snapshot corresponding to an original volume. The original volume may correspond to ...<u>a</u>

<u>*portion of the logical volumes...")*</u>; and

generating an overall snapshot of the virtual volume from the set of partition snapshots

(Wu: column 7, lines 17-51; This reference clearly generates an overall snapshot (a desired point-in-time copy of a

data volume) from a set of partition snapshots (existing snapshots 240). The reference recites 'reconstructing a

deleted snapshot'. However, the reference defines a 'deleted snapshot' as any snapshot, which is no longer a reliable

indicator of a point-in-time state of the original volume. Basically, another desired snapshot (overall snapshot) is

generated using previously created snapshots (partition snapshots, Wu: column 4, lines 50-55).).

Claim 2:

Wu discloses all the elements of claim 1, as noted above, and Wu further discloses a

method further comprising distributing the overall snapshot of the virtual volume across more

than one processor in the virtualization layer *(Wu: Fig. 1 and Fig. 2 and column 4, lines 9-15 and column*

4, lines 27-35 and column 4, lines 39-43 and column 4, lines 50-55; Each host (Fig. 1, 102 or Fig. 2, 200) contains a

volume manager. Each volume manager includes functionality to create a snapshot 270 corresponding to a virtual

volume or a portion of a virtual volume. Each host can request its own snapshot of a portion of a virtual volume.

Fig. 1 shows that there are a plurality of hosts each which can request their own snapshots from a portion of

virtualized storage (virtualization layer). Therefore, it is clear that snapshots (objects) are distributed across more

than one processor.).

Claim 3:

Wu discloses all the elements of claim 1, as noted above, and Wu further discloses

wherein each of the set of partition snapshots is created by the processor to which the

corresponding object is distributed *(Wu: Fig. 1 and Fig. 2 and column 4, lines 9-15 and column 4, lines 27-*

35 and column 4, lines 39-43 and column 4, lines 50-55; The volume manager on the host creates the partition

snapshot and the snapshot is distributed to that same host. So the snapshot is created by the processor which it is

distributed to.).

Claim 4:

Wu discloses all the elements of claim 1, as noted above, and Wu further discloses

wherein each partition snapshot further comprises state information related to the state of the

different portion of the virtual volume corresponding to the partition snapshot at the time the

partition snapshot was created *(Wu: column 9, lines 11-16; Since the system is capable of restoring a snapshot*

to a desired 'state', the snapshot point-in-time copies must have some kind of state information stored with them in

order for the system to restore them to the desired 'state'.).

Claim 5:

Wu discloses all the elements of claim 1, as noted above, and Wu further discloses a

method comprising:

creating a change log corresponding to the overall snapshot *(Wu: column 6, lines 14-25)*; and

storing, in the change log, changes to the virtual volume made after the overall snapshot

is generated *(Wu: column 6, lines 14-18).*

Claim 6:

Wu discloses all the elements of claim 5, as noted above, and Wu further discloses

wherein the change log is a copy on write (COW) change log *(Wu: column 4, lines 63-65).*

Claim 8:

Wu discloses method for creating a snapshot of a virtual volume containing stored data

(Wu: column 4, lines 50-55), comprising:

identifying a virtual volume comprising a plurality of objects defining a mapping to data

in at least one storage device wherein each one of the objects corresponds to a different portion

of the virtual volume *(Wu: column 4, lines 27-35 and column 4, lines 39-43 and column 4, lines 50-55; Note*

specifically "original volume may correspond to ... a portion of one or more logical volumes..."), and

wherein the objects are distributed across more than one processor in a virtualization layer

between at least one host and the at least one storage device *(Wu: Fig. 1 and Fig. 2 and column 4, lines*

9-15 and column 4, lines 27-35 and column 4, lines 39-43 and column 4, lines 50-55; Each host (Fig. 1, 102 or Fig.

2, 200) contains a volume manager. Each volume manager includes functionality to create a snapshot 270

corresponding to a virtual volume or a portion of a virtual volume. Each host can request its own snapshot of a

portion of a virtual volume. Fig. 1 shows that there are a plurality of hosts each which can request their own

snapshots from a portion of virtualized storage (virtualization layer). Therefore, it is clear that snapshots (objects)

are distributed across more than one processor.);

creating a set of partition snapshots for the plurality of objects, with one partition

snapshot for each of the objects, wherein each of the partition snapshots comprises a point-in-

time copy of the different portion of the virtual volume corresponding to the one of the objects

(Wu: column 4, lines 50-55 and column 5, lines 46-51; Note specifically "Volume manager includes functionality to

create a snapshot corresponding to an original volume. The original volume may correspond to ...a

portion of the logical volumes..."); and

specifying, for each of the partition snapshots, a change log volume corresponding to the

different portion of the virtual volume corresponding to the object for the partition snapshot, for

storing changes to the portion of the virtual volume *(Wu: column 6, lines 14-25 and column 7, lines 26-*

29; If the system actually chooses the modification log to use, the modification must have been chosen or specified in

some manner.);

generating <u>an overall snapshot of the virtual volume from the set of partition snapshots</u>

(Wu: column 7, lines 17-51; This reference clearly generates an overall snapshot (a desired point-in-time copy of a

data volume) from a set of partition snapshots (existing snapshots 240). The reference recites 'reconstructing a

deleted snapshot'. However, the reference defines a 'deleted snapshot' as any snapshot, which is no longer a reliable

indicator of a point-in-time state of the original volume. Basically, another desired snapshot (overall snapshot) is

generated using previously created snapshots (partition snapshots, Wu: column 4, lines 50-55).); and

storing, in each change log volume, changes made to the corresponding portion of the

virtual volume after the overall snapshot is generated *(Wu: column 6, lines 14-25; All changes*

(modifications) to all snapshots are stored in the change log (modification log).).

Claim 9:

The method of claim 8, wherein the change log volume is maintained by the processor to

which the corresponding object is distributed *(Wu: Fig. 1 and Fig. 2 and column 6, lines 14-25; The* ·

modification manager on the host is maintained by the processor for the host. And the object (snapshot) is

distributed to the host, as requested by the volume manager.).

Claim 10:

Wu discloses all the elements of claim 8, as noted above, and Wu further discloses

further comprising:

receiving a request for data stored in the virtual volume *(Wu: column 9, lines 45-61);*

determining, from the change log volume corresponding to the portion of the virtual

volume containing the requested data, whether the requested data has changed since the snapshot

was generated *(Wu: column 6, 14-18);*

retrieving the requested data from the change log volume corresponding to the portion of

the virtual volume containing the requested data when it is determined that the requested data has

changed since the overall snapshot was generated *(Wu: column 7, lines 17-51 and column 9, lines 45-61;*

When it is determined that the snapshot has changed, a new one is created using the change logs. If no change has

been made to the snapshot, there is no need to invoke the change logs. This reference clearly shows retrieving data

from a change (modification) log in order to retrieve the most recent modifications to a snapshot. See rejection of

claim 1 for explanation of 'overall snapshot' vs. 'partition snapshots'.); and

retrieving the requested data from the source volume corresponding to the portion of the

virtual volume containing the requested data, when it is determined that the requested data has

not changed since the overall snapshot was generated *(Wu: column 4, lines 40-43 and column 9, lines 45-*

61; The only time change logs are invoked in the Wu reference is when modifications have been made to a storage

volume or snapshot. At all other times, the primary (source) volumes or snapshots are accessed. See rejection of

claim 1 for explanation of 'overall snapshot' vs. 'partition snapshots'.).

Claim 11:

Wu discloses all the elements of claim 10, as noted above, and Wu further discloses a

method comprising:

retrieving the requested data from the overall snapshot, when it is determined that the

requested data has not changed since the overall snapshot was generated *(Wu: column 4, lines 40-43*

and column 9, lines 45-61; The only time change logs are invoked in the Wu reference is when modifications have

been made to a storage volume or snapshot. At all other times, the primary (source) volumes or snapshots are

accessed.).

Claim 12:

Wu discloses all the elements of claim 8, as noted above, and Wu further discloses a

method comprising distributing the overall snapshot of the virtual volume across more than one

processor in the virtualization layer *(Wu: Fig. 1 and Fig. 2 and column 4, lines 9-15 and column 4, lines 27-*

35 and column 4, lines 39-43 and column 4, lines 50-55; Each host (Fig. 1, 102 or Fig. 2, 200) contains a volume

manager. Each volume manager includes functionality to create a snapshot 270 corresponding to a virtual volume

or a portion of a virtual volume. Each host can request its own snapshot of a portion of a virtual volume. Fig. 1

shows that there are a plurality of hosts each which can request their own snapshots from a portion of virtualized

storage (virtualization layer). Therefore, it is clear that snapshots (objects) are distributed across more than one

processor.).

Claim 13:

Wu discloses all the elements of claim 8, as noted above, and Wu further discloses

wherein:

each of the plurality of partition snapshots is created by the processor to which the

corresponding object is distributed *(Wu: Fig. 1 and Fig. 2 and column 4, lines 9-15 and column 4, lines 27-*

35 and column 4, lines 39-43 and column 4, lines 50-55; The volume manager on the host creates the partition

snapshot and the snapshot is distributed to that same host. So the snapshot is created by the processor which it is

distributed to.).

Claim 14:

Claim 14 is rejected under the same reasons set forth in the rejection of claim 4.

Claim 15:

Wu discloses a system for creating a snapshot of a virtual volume *(Wu: column 4, lines 50-55)*

comprising:

a plurality of storage devices storing data corresponding to a host *(Wu: Fig. 1, 104A...104n)*;

a means for providing a virtualization layer between the host and the plurality of storage

devices, the virtualization layer comprising a plurality of objects defining a mapping to data in

the storage devices, wherein each one of the objects corresponds to a different portion of the

virtual volume *(Wu: column 4, lines 27-35 and column 4, lines 39-43 and column 4, lines 50-55; Note*

specifically "original volume may correspond to ... a portion of one or more logical volumes..."), and

wherein the objects are distributed across more than one processor in the virtualization layer

between the host and the plurality of storage devices *(Wu: Fig. 1 and Fig. 2 and column 4, lines 9-15 and*

column 4, lines 27-35 and column 4, lines 39-43 and column 4, lines 50-55; Each host (Fig. 1, 102 or Fig. 2, 200)

contains a volume manager. Each volume manager includes functionality to create a snapshot 270 corresponding to

a virtual volume or a portion of a virtual volume. Each host can request its own snapshot of a portion of a virtual

volume. Fig. 1 shows that there are a plurality of hosts each which can request their own snapshots from a portion

of virtualized storage (virtualization layer). Therefore, it is clear that snapshots (objects) are distributed across more

than one processor.); and

a means for providing a snapshot layer *(Wu: Fig. 2, 240)* between the host and the

virtualization layer, the snapshot layer comprising:

a partition snapshot of each object in the virtualization layer, wherein the partition

snapshot for each object comprises a point-in-time copy of the different portion of the

virtual volume corresponding to one of the plurality of objects in the virtualization layer

(Wu: column 4, lines 27-35 and column 4, lines 39-43 and column 4, lines 50-55; Note specifically that the

volume manager can create a snapshot of a whole volume or just a portion of a volume ("original volume

may correspond to ... a portion of one or more logical volumes...").), the partition snapshot

having references to (1) the one of the plurality of objects in the virtualization layer, (2) a

COW point-in-time copy of the different portion of the virtual volume *(Wu: column 4, lines*

63-65), and (3) a change log corresponding to the portion of the virtual volume *(Wu: column*

4, lines 61-67 and column 5, lines 46-51 and column 6, lines 14-25), and

an overall snapshot of the virtual volume comprising references to each partition

snapshot corresponding to objects comprising the virtual volume *(Wu: column 6, lines 38-44; Note*

specifically that the 'snapshot manger' maintains a history of each snapshot created and can identify (reference) each

snapshot. See rejection of claim 1 for explanation of 'overall snapshot' vs. 'partition snapshots'.).

Claim 16:

Claim 16 is rejected under the same reasons set forth in the rejection of claim 4.

Claim 17:

Wu discloses a claim 15, as noted above, and Wu further discloses wherein each change

log stores changes made to the corresponding portion of the virtual volume after the snapshot

layer is generated *(Wu: column 6, lines 14-18).*

Claim 19:

Wu discloses all the elements of claim 15, as noted above, and Wu further discloses

wherein the partition snapshot objects are distributed across the multiple processors in the

virtualization layer *(Wu: Fig. 1 and Fig. 2 and column 4, lines 9-15 and column 4, lines 27-35 and column 4,*

lines 39-43 and column 4, lines 50-55).

Claim 20:

Wu discloses all the elements of claim 15, as noted above, and Wu further discloses a

system further comprising:

an interface enabling the host to view a point-in-time representation of the data by

accessing the overall snapshot object *(Wu: column 4, lines 40-43 and column 6, lines 38-44).*

Claim 21:

Wu discloses all the elements of claim 15, as noted above, and Wu further discloses a

system comprising:

an interface enabling the host to specify when the snapshot layer is created *(Wu: column 4,*

lines 40-43 and column 6, lines 48-55; The first reference discloses user applications used to perform operations

carried out by the Wu reference. The second reference shows that the creation of snapshots (snapshot layer) can be

set at different frequencies. There must be some means provided in the user applications that allow for the user to

change set the frequency of snapshot creation and therefore allowing the user of the host computer to specify when a

snapshot is created.).

Claim 22:

Wu discloses all the elements of claim 15, as noted above, Wu further discloses wherein

the snapshot layer is created on a periodic basis *(column 6, lines 48-55; Note the reference shows the*

snapshots can be generated daily or weekly.).

Claim 23:

Claim 23 is rejected under the same reasons set forth in the rejection of claim 1.

Claim 24:

Claim 24 is rejected under the same reasons set forth in the rejection of claim 3.

Claim 26:

Claim 26 is rejected under the same reasons set forth in the rejection of claim 5.

Claim 27:

Claim 27 is rejected under the same reasons set forth in the rejection of claim 1.

Claim 28:

Claim 28 is rejected under the same reasons set forth in the rejection of claim 3.

Claim 29:

Claim 29 is rejected under the same reasons set forth in the rejection of claim 4.

Claim 30:

Claim 30 is rejected under the same reasons set forth in the rejection of claim 5.

Claim 31:

Claim 31 is rejected under the same reasons set forth in the rejection of claim 4.

Claim 32:

Claim 32 is rejected under the same reasons set forth in the rejection of claim 5.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4.   Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wu and further in

view of U.S. Patent Number 6,173,293 issued to Chandramohn A. Thekkath et al. (hereinafter

"Thekkath").

Claim 7:

Wu discloses all the elements of claim 5, as noted above, but Wu does not explicitly

disclose wherein snapshot cannot be changed after it is generated.

However, Thekkath discloses wherein the partition snapshot cannot be changed after it is

generated *(Thekkath: column 13, lines 8-14).*

It would have been obvious to one of ordinary skill in the art at the time the invention

was made to modify the teachings of Wu with the teachings of Thekkath noted above for the

purpose of not allowing a snapshot to be changed after it is generated *(Thekkath: column 13, lines 8-14)*. The skilled artisan would have motivated to improve the teachings of Wu per the above such that access to would be controlled so that any user's view of any file at any one time is consistent any other user's view *(Thekkath: column 3, lines 33-37)*.

Response to Arguments

Applicant Argues:

The Examiner also rejected claim 27 as not being limited to physical articles or objects, which are structurally and functionally interrelated to the program in such a manner that would enable the program to act as a computer component and realize any functionality. Office Action at 3-4. The foregoing arguments with respect to claims 1, 8, 23, and 27 also demonstrate that the computer readable medium of claim 27 enables the program to realize functionality of creating an overall snapshot of a virtual volume. In addition, the Applicant's have amended claim 27 to read, "a tangibly-embodied computer readable medium..." to make clear that all embodiments of the invention must be tangible.

Examiner Responds:

Examiner is not persuaded. The claims were rejected because the Applicant's

specification paragraph [0175] appears to include communication and transmission mediums

such as carrier waves and the like to be included in what the Applicant considers computer

readable mediums. The program set forth by the Applicant *can* enable a computer system to

realize functionality of creating an overall snapshot of a virtual volume when embodied on a

computer readable <u>storage</u> medium and executed by a computer.

However, when the program set forth by the Applicant is contained in or conveyed by a

communication or transmission medium (i.e., carrier waves or the like), the program is not

limited to physical articles or objects, which are structurally and functionally interrelated to the

program in such a manner that would enable the program to act as a computer component and

realize any functionality. A program contained in or conveyed by such a medium does not fall

into one the patentable categories of invention, nor does a program contained in or conveyed by

such a medium fall into one of the three judicial exceptions to patentable subject matter.

The claims, as amended, still do not overcome the possibility that the medium claimed

by the Applicant could include a communication medium or transmission medium because

paragraph [0175] appears to lump communication mediums and/or transmission mediums

under a computer readable medium. Therefore, the claims remain rejected under 35 U.S.C. 101.

The words 'a tangibly-embodied computer readable medium' fail to resolve this

deficiency. The Examiner would favorably consider an amendment to the claims reciting "...a

computer readable <u>storage</u> medium..." It is the Examiner position at the this time that an

amendment of this nature may resolve the 35 U.S.C. 101 deficiencies of claims 27-30.

Applicant Argues:

The Examiner rejected system claim 15 as not limited to any physical articles or objects and suggested amending claim 15 in the same manner as claim 1 to recite a useful, concrete, and tangible result. Office Action at 4. While Applicants disagree with this conclusion, in the interest of expediting examination, Applicants have amended claim 15 similarly to claim 1. Claim 15 is now directed to "a system for creating a snapshot of a virtual volume," and thereby has a useful, concrete, and tangible result – an overall snapshot object.

Examiner Responds:

Examiner is not persuaded. The Applicant has failed to completely amend claim 15 in

the same manner as claim 1. While the amendment to claim 15 has effectively added a practical

application of the claimed invention, claim 15, as amended, still fails to set forth a useful,

concrete, and tangible result of a practical application of the claimed invention. This is because

nothing ever actually occurs with the claimed invention. No steps are actually performed.

Examiner notes that claim 15 is a system claim. Normally, a system or apparatus claim is not required to have a useful, concrete, and tangible result. This is because system or apparatus claims are almost always limited to physical articles or objects, thereby causing the system or apparatus to fall into a statutory category of patentable subject matter.

However, claim 15 does not appear to be limited to any physical articles or objects. It appears that the Applicant is seeking to patent particular programmed functionality of the components of the system rather than the components themselves. Most of the limitations of the Applicant's claims appear to be directed to software subroutines (see above office action for specifics). Since the limitations are indeed directed to programmed functionality and not the components of a system or apparatus themselves, the claimed programmed functionality must have a final result which is useful, concrete, and tangible. The rejections given under 35 U.S.C. 101 to claims 15-22 are upheld.

An amendment similar to the amendment of claim 1, which actually recites "...generating an overall snapshot of the virtual volume form the set of partition snapshots..." would be favorably considered by the Examiner. This is because actually carrying out this step would provide a final, tangible step which is also both useful and concrete.

Applicant Argues:

First, Wu does not disclose or suggest, "...wherein each one of the objects corresponds to a different portion of the virtual volume, and wherein the objects are distributed across more than one processor in a virtualization layer," as recited in claims 1, 8, 15, 23, and 27.

However, Wu, in FIG. 1 or otherwise, does not disclose or suggest a method for virtualization wherein objects corresponding to a different portion of the virtual volume are distributed across more than one processor. While FIG. 1 shows multiple servers, which each may have multiple processors, there is no disclosure or suggestion in Wu of how objects corresponding to different portions of the virtual volume would be distributed across multiple processors in a server, or across the multiple servers of Fig. 1.

Examiner Responds:

Examiner is not persuaded. The Wu reference clearly discloses "...wherein each one of the objects corresponds to a different portion of the virtual volume *(Wu: column 4, lines 27-35 and column 4, lines 39-43 and column 4, lines 50-55; Note specifically "original volume may correspond to ... a portion of one or more logical volumes...")* and wherein the objects are distributed across more than one processor in a virtualization layer" *(Wu: Fig. 1 and Fig. 2 and column 4, lines 9-15 and column 4, lines 27-35 and column 4, lines 39-43 and column 4, lines 50-55).* Each host (Fig. 1, 102 or Fig. 2, 200) contains a volume manager. Each volume manager includes functionality to create a snapshot 270 corresponding to a virtual volume or a portion of a virtual volume. Each host can request its own snapshot of a portion of a virtual volume. Fig. 1 shows that there are a plurality of hosts each which can request their own snapshots from a portion of virtualized storage (virtualization layer). Therefore, it is clear that snapshots (objects) are distributed across more than one processor because each host requests their own snapshot.

Applicant argues that Wu does not disclose or suggest a method for virtualization where objects corresponding to a different <u>portion</u> of the virtual volume are distributed across more than one processor. But, as cited numerous times above, it is clear that the Wu reference discloses creating a snapshot of a portion of a virtual volume *(Wu: column 4, lines 27-35 and column 4, lines 39-43 and column 4, lines 50-55)* and further distributing a snapshot to more than one processor *(Wu: Fig. 1 and Fig. 2 and column 4, lines 9-15 and column 4, lines 27-35 and column 4, lines 39-43 and column 4, lines 50-55).*

Since the Wu reference discloses all the element of the Applicant's claimed invention,

the rejections given under 35 U.S.C. 102(e) are upheld.

Applicant Argues:

Second, Wu does not disclose or suggest, "generating an overall snapshot of the virtual volume from the set of partition snapshots," as recited in claims 1, 8, 23, and 27 or "an overall snapshot object of the virtual volume comprising references to each partition snapshot," as recited in claim 15. Indeed, the Examiner concedes that Wu does not disclose "combining intermediate snapshots from each processor to generate the snapshot of the source volume." Office Action at page 14.

While Wu discloses that the volume manager may create a snapshot corresponding to a portion of a logical volume, Wu does not disclose generating an overall snapshot from a set of those snapshots corresponding to a virtual volume.

Examiner Responds:

Examiner is not persuaded. First, it is worth noting that Applicant's claim amendments

have clarified the meaning of an intermediate snapshot for the Examiner. Since an intermediate

snapshot is in fact a partition snapshot (i.e., a snapshot of a portion of a virtual volume), it is

abundantly clear that the Wu reference discloses partition snapshots *(Wu: column 4, lines 27-35 and*

column 4, lines 39-43 and column 4, lines 50-55; Note specifically "original volume may correspond to ... a

portion of one or more logical volumes...") and furthermore, it is abundantly clear that the Wu

reference discloses generating an overall snapshot of the virtual volume from the set of partition

snapshots *(Wu: column 7, lines 17-51).*

Wu column 7, lines 17-51 clearly generates an overall snapshot (a desired point-in-time

copy of a data volume) from a set of partition snapshots (existing snapshots 240). The reference

recites 'reconstructing a deleted snapshot'. However, the reference defines a 'deleted snapshot'

as any snapshot, which is no longer a reliable indicator of a point-in-time state of the original

volume. So, another desired snapshot (overall snapshot) is generated using previously created

snapshots (partition snapshots, Wu: column 4, lines 50-55).

Since it is clear that the Wu reference discloses all the elements of Applicant's claimed

invention, the rejections given under 35 U.S.C. 102(e) are upheld.

Applicant Argues:

Similarly, the rejection of claim 7 under 35 U.S.C. § 103 should be withdrawn because a prima
facie case of obviousness has not been established based on Wu in view of Thekkath where the
combination of Wu and Thekkath does not teach and suggest all elements of claim 7.
    For at least these reasons, Wu is not combinable with Thekkath to disclose or suggest each
element of claim 7 and the rejection under 35 U.S.C. § 103 should be withdrawn.

Examiner Responds:

Examiner is not persuaded. The only attempt presented to refute the Examiner's prima

facie case of obviousness has been the Applicant's own arguments and opinions. No evidence

has been presented to support the Applicant's arguments and opinions. The Examiner notes the

rule set forth in 37 C.F.R. 1.111(b) which requires Applicant to "distinctly and specifically point

out errors" in the Examiner's office action. Furthermore, it should be noted that arguments,

opinions, or conclusions of Applicant and the Applicant's counsel cannot take the place of

evidence (See *In re Budnick*, 537 F.2d at 538, 190 USPQ at 424; *In re Schulze*, 346 F.2d 600, 145

USPQ 716 (CCPA 1965); *In re Cole*, 326 F.2d 769, 140 USPQ 230 (CCPA 1964)).

Due to lack of persuasive arguments, the rejections given under 35 U.S.C. 103(a) are

upheld.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Patrick A. Darno whose telephone number is (571) 272-0788. The examiner can normally be reached on Monday - Friday, 9:00 am - 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Don Wong can be reached on (571) 272-1834. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

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information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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